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 AND OF
THE INSTITUTIONS IN UNION.

111TH SESSION.]

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Proceedings of the Society.

MUSICAL EDUCATION COMMITTEE.

The following is a continuation of the information relating to Musical Education on the Continent, collected by this Committee:—

AUSTRIA.

The well-known Conservatoire of Music at Vienna forms a part of a general institution, entitled, "The Society of Friends of Music in Austria," established for the cultivation and promotion of music. The following is a translation of a characteristic official document, setting forth the circumstances which gave rise to the establishment of the Society, and the history of the Conservatoire itself* :—

In the year 1811, an association of noble ladies, having for its object the encouragement of works of beneficence and utility, was established in Vienna. This association, which since that period has been in constant activity, was engaged in discussing by what means substantial assistance could be rendered to the inhabitants of the seat of war beyond the Danube, as well as to the town of Baden, which had recently suffered from a fearful conflagration, to which end it was requisite to raise from the charitably-disposed contributions to a considerable amount.

Fanny, Baroness von Amstein, one of the leading members of the association, a lady of rare merit and unbounded liberality, conceived the idea of giving a concert on a grand scale, and in a building the most capacious that might be obtainable for the purpose. The well-known instrument maker and pianiste, Herr Streicher, suggested the performance of Handel's great work, "Alexander's Feast," with Mozart's additional accompaniments, a selection which was creditable alike to his taste and discernment. His Majesty the Emperor Francis granted permission for the rehearsals to be held in the new "Rittersaal" of the Palace, the concert itself in the imperial riding-school, defraying, moreover, the expenses incurred in fitting up this magnificent building for a concert-room.

With her characteristic activity the Baroness, assisted by Herr Streicher, issued invitations to the votaries of music of all ranks to co-operate in the undertaking. Prince Lobkowitz, an enthusiastic amateur, whose wife was the first lady-president of the association, arranged

for the preparatory vocal rehearsals at his own hotel. The required number of instrumental performers was soon complete, and the first performance of the work, under the title of "Timotheus, or the Power of Music," came off on the 29th of November; the second on the 3rd of December following; Herr Streicher leading on the pianoforte. The Hofrat von Mosel was conductor. The orchestra numbered 720 individuals of all classes, who cordially united in giving this grand musical treat for so praiseworthy an object.

The multifarious arrangements, which were more numerous than it might be supposed, were chiefly carried out by Count Dietrichstein, the treasurer of the Association, and the privy councillor, Herr J. Sonnleithner, whom the Emperor, as founder of the society, had appointed to be its permanent secretary.

A few days before the second performance, Herr Sonnleithner was struck with the idea that, from the general enthusiasm aroused by Handel's great classical work, hopes might be entertained of realising a long cherished desire, namely, to unite the numerous assemblage of the lovers of music into a permanent society, having for its object the encouragement of the art in all its branches, and the foundation of a Conservatoire, which latter had long been a desideratum in Vienna. Great composers had here formed themselves, independently of extraneous aid (*gleichsam aus sich selbst gebildet*); such an establishment would tend to the development of similar talent, which only needed opportunity to discover its latent powers, and a guiding spirit to direct it on the right course.

Now, when a vivid interest was awakened, appeared to be the most favourable, perhaps, indeed, the only opportunity which augured success, but it was necessary that no time should be lost. Herr Sonnleithner drew up a programme, briefly setting forth the advantages to be derived from such a reunion of amateurs, and the formation of a regular society, and inviting those who might be desirous of joining to enter their names in a list, which was opened for the purpose at the hotel of Prince Lobkowitz, by which entry they were only to be bound in case the rules of the society, when drawn up, should receive the Emperor's assent. The proposition was eagerly entertained by those who had taken part in the performance of "Timotheus," and in a few days the number of entries exceeded 1,000. Various motives, no doubt, concurred in bringing about this result; many were desirous of hearing musical works of a high standard brought forward in a manner worthy of their reputation; many were desirous of taking part themselves in the performances; while all were actuated by the laudable wish of aiding in the establishment of a school in which pupils might be fittingly trained. Upon this, the leading object of the Association was declared

* Extract from the Annual Report for 1860-61.

to be the elevation of music in all its branches, to which individual practice and enjoyment were to be considered subordinate.

For the attainment of this prime end a Conservatoire of Music was to be established, in which pupils of both sexes from the various Austrian provinces might receive instruction in singing, in declamation, instrumental music, practical thorough bass, in composition, in languages, and other collateral subjects. Works of classical repute, already in existence, were to be performed under the auspices of the Society, partly in order to create a higher standard of musical taste, and partly thereby to awaken germs of talent in the pupils, and to excite in them the desire of obtaining similar distinction in musical composition, in which they would be encouraged by rewards from the association to such an extent as its means would allow.

In 1816 the Association found itself in a position to warrant its proceeding with such an undertaking. Hofrath von Mosel, being requested to draw up a scheme for this purpose, at once undertook the task, and on his plan the course of study was based. It having been laid down as a principle that all the pupils, even those who intended to devote themselves in future to instrumental music, should previously receive instruction in singing—a school for singing was in the first instance organized, and opened on the 1st of August, 1817. In 1819 the violin school was opened, and as the pupils in the singing school had already made considerable progress in their elementary studies, and it became necessary that they should receive instruction in the more advanced stages (which is of an essentially different nature), a third class was instituted for those among the female students whose talents and assiduity held out a promise of higher development. In 1821 the course of study pursued had been attended with such success, that the association began to think of enlarging the establishment, and in order to meet the largely-increasing outlay found it necessary to invite a special subscription, and several liberal patrons put down their names for various amounts for a term of six years. In 1823 the pupils had already made such progress that it was resolved on holding an examination in presence of the assembled members and the public generally, and it was accordingly held in the hall of the Lower Assembly.

An unexpected opportunity for bringing the pupils of the Conservatoire into public notice occurred in 1825, owing to the closing of the Court theatre adjoining the Kärntnertor. Permission was granted for the performance of two concerts, which were given on the 30th October and 9th November, and met with general approbation. In the same year the students were presented, in the great hall of the society, to its illustrious patron, his Imperial Highness the Cardinal Archduke Rodolph. It was resolved, in order to excite the emulation of the students, to distribute premiums among such of them as showed the greatest proficiency, partly in the form of silver medals, and partly in useful musical works.

The progress made by the Conservatoire induced all those who had given a year's subscription to promise a continuance of the same.

Up to the year 1830 the operations of the Institute were carried on in hired premises, until at length the society, having attained a recognised position, was enabled, by the liberal assistance of its patrons, to acquire possession of the house No. 558, Unter den Tuchlauben, and to undertake the necessary additions thereto. The pupils were now enabled to practise in concert in the music-hall of the Society, their exercises becoming thereby of additional interest. Public performances were given regularly from 1831 till 1847, the proceeds from which were applied partly in establishing scholarships for the more talented pupils and partly to charitable purposes. On two occasions (on the 29th March, 1837, and the 21st of the same month in 1847) the students had the honour of performing in the presence of the Imperial Court. After a short interruption,

caused by the events which occurred in 1848, the operations of the school were resumed, with certain alterations which, through the progress of time, had become necessary; and notwithstanding many obstacles in the way of their fuller development, carried on to the present time. That its advancement has been in no wise behind that of similar institutions in other countries is mainly owing to the disinterested zeal of those men who have, for very inadequate remuneration, devoted their professional talents and experience to the artistic education of their successors.

The course of study embraces every kind of musical education except the organ, for which, unfortunately, space has hitherto been wanting. There is a singing class for boys, one for girls, two for the pianoforte, three for the violin, and one each for the violoncello, double bass, flute, clarinet, horn, trumpet, trombone, &c., in addition to thorough bass, composition, recitation in German and the Italian languages. The study of acoustics, the history of music, and other collateral subjects, for which competent teachers could have been obtained free of expense, were, however desirable, omitted for want of sufficient accommodation. For the last ten years the annual number of pupils has been very nearly 200, of whom more than two-fifths received entirely gratuitous instruction; besides these, from 40 to 50 have each year been refused admission for lack of space. There have also always been among the students some who have been received into the Conservatoire on special grounds—such as military bandsmen, pupils from the asylums for the blind, &c. The annual results of the instruction given are brought into notice through public examinations, which, more especially of late years, have been remarkably well attended. The concerts given by the pupils, under the able direction of Herr Hellmesberger, gave evidence—not only of their marked advance in individual proficiency, but also of the advantage derived from their practising in concert.

Had it not been for the liberal support all along accorded to the Conservatoire by its illustrious patrons, it would have been impossible for the society, notwithstanding the most strenuous efforts, and notwithstanding the unceasing self-devotion of the professors, to have placed it on an established foundation. In this respect it must ever hold in cherished remembrance one of its earliest patrons—the late Archduke Cardinal Rodolph, who, himself an accomplished amateur, took through life a deep interest in its success, after whose lamented decease his illustrious brother, the Archduke Anthony Victor, was graciously pleased to undertake its protectorate, and accorded to it numerous liberal tokens of his favour. The society has also to be deeply thankful to his Majesty the Emperor Ferdinand the First for an annual contribution, for three years, of 3,000 florins from the Imperial Treasury, granted in 1842, and afterwards extended for three years in addition, that is to say, till 1848; and since 1851 it has been in receipt, through the favour of the Emperor Francis Joseph the First, of a like annual amount up to the present time. In consideration of the advantages derived from the Conservatoire, the Common Council of Vienna, in the year 1851, voted an annual subscription of 2,000 florins, since extended for a term of six years, besides special gifts, which the Society for its general utility, has received on various occasions from members of the Imperial family, as well as from the Emperor's privy purse, and the liberality of private amateurs.

This document concludes with a list of 130 vocalists and instrumentalists, of greater or less note in the musical world, who received their education in the Conservatoire. The society is governed by a president, vice-president, and 12 members, elected for three years, but re-eligible. The Conservatoire is divided into the administrative branch and the artistic branch. The former is governed by a "referent" and 24 inspectors of the different schools into which the Conservatoire is classed; the latter by an artistic director and 23 profes-

sors of different lengths of service from 43 years downwards. The number of pupils in the year 1863-4, was 309, of whom 199 were males and 110 females; 106 of the number paid no education fees, and 33 half-fees only. The charge for education is described as the smallest existing anywhere.

The following are some of the provisions of the statutes of the general society, the chief objects of which are stated to be (1) the maintenance of a Conservatoire; (2) the public performance of good musical productions; (3) the maintenance of a musical library and its appurtenances; (4) general vocal and instrumental rehearsals and performances of the members; and (5) the encouragement of rising musicians by experimental or public performances of their works or otherwise.

The society consists of honorary and ordinary members, the latter comprising supporting or subscribing (*unterstützend*) members paying 10 florins* a year (16s. 8d.) of which 4 fl. is applied to the Conservatoire, participating (*theilnehmend*) members, paying 6 fl., and effective (*augtibend*) members paying 4 fl. and assisting by singing or playing. A general meeting of the society is held every year for receiving the reports of the direction and other business. The directors of the society have a discretionary power of relieving, wholly or partly, from education fees those of the pupils in the Conservatoire whose means are insufficient, and who prove themselves deserving of such a privilege by one year's attentive study. The directors have also a general control over the affairs of the Conservatoire. The society gives four public concerts a year under the management of the artistic director, besides extra concerts. For the purpose of rehearsal and performance of the members, the society is divided into a vocal union (*sing-verein*) and an orchestral union (*orchester-verein*), both of which have the right of using the society's hall once a week free of charge. Each union has to make an annual report to the directors.

The following particulars are taken from the annual report presented to the general meeting of the society on the 21st December, 1864:—

Out of the total number of 309 pupils above mentioned, 42 were in the school for wind instruments, 58 in that for stringed instruments, 118 in the piano school, 35 in the boys' singing school, 31 in the girls' singing school, &c., &c. A pension fund for the professors of the Conservatoire has just been established.

The total receipts of the Society and Conservatoire for the year 1864-5 are estimated as follows:—

1. RECEIPTS OF THE SOCIETY.

	Florins.*
Balance from last year	2,126
Ordinary contributions of members	5,400
Extraordinary ditto	1,000
Receipts from concerts	2,500
Interest on investments	1,131
House rent, &c.	2,400
Rent of hall	3,500
Charges for heating and lighting	520
Total	<u>18,577</u>

RECEIPTS OF THE CONSERVATOIRE.

Contributions of supporters (including 3,000fl. from the State, 2,000fl. from the commune of Vienna, &c.)	5,200
Matriculation fees	150
School fees	8,000
Interest on investments	152
Total	<u>13,502</u>
Grand total	<u>32,079</u>

* The florin is equal to 1s. 8d.

The expenditure is estimated as follows:—

1. EXPENDITURE OF THE SOCIETY.

	Florins.
Salaries and fees	2,154
Expenses of concerts	6,000
Interest on mortgage	2,320
Paid off mortgage	2,100
Taxes, &c.	2,380
Cost for heating and lighting	2,100
Library, printing, and miscellaneous expenses	2,640
Total	<u>19,064</u>

2. EXPENDITURE OF THE CONSERVATOIRE.

	Florins.
Salaries	9,400
Fees (remunerations)	1,400
Purchase of musical instruments and other expenses	656
Total	<u>11,456</u>
Grand total	<u>31,120</u>

Surplus of receipts over expenditure 959

The assets of the society are stated to include the following items:—

	Florins.
(1.) Balance in hand as above	2,126
(2.) Purchasing price of the Society's old houses	43,050
(3.) Value of the existing house, after deducting mortgage of 46,000 florins	25,200
(4.) Investments (nominal amount)	20,420
(5.) Cash balance at the bank	1,050
(6.) Value of library, musical instruments, furniture, &c.	23,200

The Conservatoire has assets consisting of investments of the nominal amount of 3,200 florins.

The society is just commencing the erection of a magnificent new building for which the Government has granted a site and half the produce of two lotteries. In connection with this structure is to be a great monument in honour of Gluck, Haydn, Mozart, Beethoven, and Schubert, towards the erection of which a special fund of 5,000 florins has been raised.

BOHEMIA.

By an arrangement similar to that adopted in Austria, the association established at Prague, and entitled "The Society for the Promotion of Music in Bohemia," is combined with and directs a musical institute known as the Conservatoire of Prague.

The society consists of three classes of members, viz.:

- (1.) Contributing, paying 40 florins and upwards a year.
- (2.) Effective, possessing musical knowledge, living in Prague and not holding office in the Conservatoire.
- (3.) Honorary.

The society professes to train members of orchestra, solo players, and singers for concerts and stage, and by means of good musical productions to spread a taste for music, giving public performances of the pupils. The society is governed by a president and six members, elected for three years and re-eligible. The statutes contain minute rules for their guidance, and for the working of the society, instructions to the office bearers, &c.

A pension fund is connected with the Conservatoire for giving pensions to the directors, professors, &c., and also to their widows; the necessary funds being raised by an annual percentage on the net receipts of the concerts, &c., &c. The pensions vary from one-half the salary when the service has been under ten years, to the whole salary when it exceeds 20 years; and the widows receive 200 florins a year. The fund is managed by a President, who is the head of the general society, three other members of the governing body of the society, two

professors, and the directors of the Institute. The course of proceeding is defined by statutes. The fund amounted to 8269 fl. at the end of 1864.

The Conservatoire contains an instrumental school and a singing school, divided into a concert school and an opera school, all governed by minute statutes. The yearly report for 1864 shows that the society had thirteen honorary, six effective, and seventy-nine contributing members, subscribing 5,481 fl. It possessed a capital of 20,947 fl. The receipts for 1865 (including a balance in hand of 2,363 fl.) are estimated at 13,820 fl., of which 4,200 fl. is a subvention by the Government from the "Landesdomestical" fund, 5,349 fl. subscriptions, 900 fl. interest, 500 fl. net produce of concerts, and the rest miscellaneous. The expenses are estimated at 12,432 fl., viz: 6,704 fl. salaries, 2,075 fl. allowances, 915 fl. pensions, 690 fl. taxes, &c.

The Instrumental School where the term of education is six years, contained 57 pupils in the 1st class admitted in 1861, and 43 pupils passed out of the Conservatoire as qualified in the 2nd or higher class admitted in 1858 ; of these 43, 27 at once obtained appointments in orchestras, &c. The Opera School, with an education of from two to three years, contains five females and one male, and the Concert School, where the term of education is two years, 10 female pupils. All the pupils receive a general as well as a musical education. Three concerts, producing 605 fl. net, were given in the year 1864. The education is gratuitous for natives in all the schools. Foreigners pay 60 fl. a year in the Instrumental and Concert schools and 80 fl. in the Opera school.

Proceedings of Institutions.

ABERSYCHAN LITERARY AND SCIENTIFIC INSTITUTION.—The report for the past year, read at the annual meeting of the members, on the 27th February last, congratulates the members on the favourable position the society has attained in this the first year of its existence. Thanks to the proprietors of the works at this place, and to their manager, Mr. Richards, a room has been provided and set apart for the purposes of the Institution ; and everything to adapt it to the convenience of the members has been provided by them free of cost. In February, 1864, the first meeting of the society was held. In the first quarter the number of members reached about seventy, and this number has been steadily maintained throughout the year. The books purchased by the society during the year number altogether 92 volumes. The issue during the year has not been large, numbering about 140 volumes, with proportionable number of periodicals. The financial statement shows that the income has amounted to £54 7s. 7d., and that there is a balance in hand of £13 13s. 11d.

ASHTON AND DUKINFIELD MECHANICS' INSTITUTION.—The last report shows that the number of members is increasing, and the directors have spared no pains to meet that increase by increased attractions. In the early part of the year the directors opened an Exhibition of Paintings and Works of Art. The exhibition was open three days, and gave general satisfaction. The discussion society, which meets on alternate Monday evenings, is well attended, and its meetings are a source of great interest to its members. A chess and draught club has also been established. Both these societies are open to the members on payment of a small annual subscription. The number of members was 551 at the date of the issue of the report, showing an increase of 31 over the former year. The classes now in operation are :—Writing, arithmetic, grammar, geography, and mathematics ; present number of members, in senior class, 60 ; in junior class, 52 : French, mechanical, architectural, and freehand drawing. The Committee of Council on Education have awarded the Bronze Medal of the Art Department to

several pupils. The present number of volumes in the library is 3,616, being an increase of 146 over the previous year ; the total number of issues is 7,416. In the reading and news room reports from the Liverpool cotton market, and from the leading corn and produce markets are regularly laid upon the telegram stand, so that those interested in trade may obtain information which will prove of value to them. The financial statement shows that the receipts have amounted to £315 13s. 11d., and that there is a balance in hand of £4 14s. 6d.

BURNLEY MECHANICS' INSTITUTION.—The report for last year says that the continued depression of trade has rendered it expedient that the efforts of the directors should almost be exclusively directed to maintain unimpaired the usefulness of the leading departments of the Institution. The circulation of books for the year amounts to 7,660 volumes, and the total number of volumes in the library is 4,436. The class registers show in the aggregate a small decrease in the number of members, the number of males being 150, females, 66 ; total, 216. In 1863, the numbers were—males, 177, females, 47 ; total, 224 ; decrease of males, 27 ; increase of females, 19 ; making the absolute decrease since 1863 to be 8. In the manufacturing districts of Lancashire, where the demand for female labour is such that girls are removed from school or domestic employment at an early age, a well-devised system of secondary education for females is of the greatest social importance. The directors have been desirous to make the female classes attractive, and adapted to their special duties. A series of lectures and conversations, by Dr. Brumwell, on Domestic Affairs, and subjects intimately connected with them, have been held for the benefit of the members of these classes and their female friends. Generally the attendance of the members at the classes has been regular, and their progress commendable ; these remarks especially apply to those who entered the various examinations during the year. In the year 1863 the number of members was 364 ; in the year 1864, 347 ; decrease, 17. Out of the 17 removed from the list, 15 have become subscribers to the Exchange, so that although not counted, they still remain members of the Institution. The Exchange register exhibits a large addition of subscribers, the numbers being, residents, 249 ; non-residents, 165 ; total, 414. In 1863 the numbers were, residents, 221 ; non-residents, 88 ; total 309. Increase in the year 1864, 105. This remarkable increase of subscribers, and the consequent crowding of the room on market-days, rendered larger space and increased accommodation necessary ; this has been supplied. The financial statement shows that the income has been £498 8s. 9d., and that there has been an excess of expenditure amounting to £51, which may be ascribed to the large outlay on the improvement of the Exchange, and to the absence of the usual item of profit arising from a public soirée. About the time of making arrangements for this festival the state of trade was so appalling, that the directors decided that it was inexpedient to hold a soirée under such circumstances.

EXAMINATION PAPERS, 1865.

(Continued from page 538.)

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April last :—

MENSURATION.

THREE HOURS ALLOWED.

1. Prove that a rain-fall of an inch gives about 100 tons to the acre. What would a fall of a centimetre give to the hectare ?

2. Show how to measure a given parallelogram.

The perpendicular distances between the opposite sides of a parallelogram are to be two and three inches ; find the

area of the least parallelogram which satisfies this condition; and construct another which is twice this area, and satisfies the same condition.

3. Explain the construction and use of the *diagonal scale*.

4. Find the area of a right-angled triangle, one side of which is 15 inches, and the hypotenuse $3\frac{1}{2}$ feet.

5. A rectangle is 8ft. 6in. long, and 4ft. 9in. broad, find its cost at 1s. 6d. per foot, by duodecimals.

6. Draw a plan, and find the area of a field from the following notes:—

444 to A
182 264
From C on R
336 to C
From B on R
564 to B
From A

7. Prove that the perimeter of a square is less than the perimeter of a rectangle of the same area.

Find the least number of hurdles, each 2 yards long, which will enclose an acre of land of rectangular shape.

8. Find the cost, at £6 15s. per rod, of the outer walls of a house 35ft. wide, 28ft. 6in. deep, and 35ft. to the roof, there being a gable at each end, rising 32 courses of bricks, reckoning 4 courses to a foot, the first 12ft. being 2 bricks thick, the next 15 being $1\frac{1}{2}$, and the rest 1 brick thick.

9. Find the area of a circle whose diameter is 113 inches, and circumference 365.

10. Find the diameter of a 600-pound cannon ball whose specific gravity is 7.2.

11. The curved surface of a circular cylinder is 10ft., the areas of its two ends the same as that of a circle 10in. in diameter: find its volume, and the weight of the water which it will contain.

12. Prove that the volume of any pyramid is equal to one-third of its base into the height.

TRIGONOMETRY.

THREE HOURS ALLOWED.

1. Find the circular measure of $2^{\circ} 4'$ French and of $1^{\circ} 50' 9\cdot6$ English.

2. Prove that $\sin. 2a = \frac{2 \tan. a}{1 + \tan.^2 a}$

And that $\cot. (a-b) = \frac{\cot. a \cot. b + 1}{\cot. b - \cot. a}$

3. If A B C be a triangle, sides a b c, then $c^2 = a^2 + b^2 - 2ab \cos. C$. Adapt this to logarithmic computation.

4. A B C is a triangle, and A D meeting the base in D divides angle A into two angles, m and n, so that $\sin. \frac{m}{n} = \frac{c}{b}$

Prove that $\cot. m - \cot. n = \cot. C - \cot. B$; the angle B A D = m.

5. Prove that—

$$(1) \frac{\sin. (2a+b)}{\sin. a} = 2 \cos. (a+b) + \frac{\sin. b}{\sin. a}$$

$$(2) \operatorname{Cosec}. 2a + \operatorname{Cot}. 4a = \operatorname{Cot}. a - \operatorname{Cosec}. 4a.$$

6. Find a when

$$(1) \sin. 5a = 16 (\sin. a)^5$$

$$(2) \sin. a + \sin. 2a + \sin. 3a + \sin. 4a = 0.$$

$$(3) \cos. a - \cos. 2a = \sin. 3a.$$

7. If A B C be the angles of a triangle—

$$(1) a(b \cos. C - c \cos. B) = b^2 - c^2$$

$$(2) \frac{\tan. A}{\tan. B} + \frac{\tan. B}{\tan. C} + \frac{\tan. C}{\tan. A} + \frac{\tan. A}{\tan. B} + \frac{\tan. B}{\tan. A} + \frac{\tan. A}{\tan. C} = \sec. A \sec. B \sec. C - 2.$$

8. In a right-angled triangle C = 90° : $c = 7584 : b = 3000$; find B, when

$$\log. 7\cdot584 = .8798983 : \log. 2 = .30103$$

$$\log. \sin. 34^{\circ} 59' = 9\cdot7584105 : \text{diff. for } l' = .0001805$$

9. A D and B E are perpendiculars from the angles A and B of the triangle A B C on the sides opposite. Show that D E = c Cos. C.

10. The radius of the circle inscribed in a triangle, $= a \sin. \frac{B}{2} \sin. \frac{C}{2} \sec. \frac{A}{2}$

11. Sum the following series to infinity—

$$\sin. a + \frac{1}{1\cdot2} \sin. 2a + \frac{1}{2\cdot3} \sin. 3a, \text{ &c.}$$

12. The elevation of Cadair Idris, at a point in the valley near Dolgelly, is Cot. $-1^{\circ} 6'$; at Ty Gwyn, $3\frac{1}{2}$ miles down the valley, it has the same elevation; at a point half-way between, its elevation is Cot. $-1^{\circ} 5'$. Show that its height above the valley is $\frac{7}{4\sqrt{11}}$ miles.

13. In a spherical triangle find the sine of the angle in terms of the sides.

14. Find the area (*s*) of a spherical triangle in terms of its angles.

15. And then show that—

$$\cot. \frac{s}{2} = \cot. \frac{a}{2} \cot. \frac{b}{2} \operatorname{Cosec}. C + \cot. C$$

16. Given B, a and b, and $\cot. \theta = \cos. b \tan. a$, Prove that $\sin. (c + \theta) = \cos. b \sin. \theta \sec. a$

CONIC SECTIONS.

THREE HOURS ALLOWED.

SECTION I.—GEOMETRICAL CONICS.

1. Define a cone, a parabola, the focus of a parabola, the diameter of a conic. Show that in a parabola the sub-normal is constant, and the sub-tangent is double of the abscissa.

2. In the parabola prove that $NP^2 = 4AS \times AN$.

3. Tangents which meet on the directrix of a parabola are at right angles to each other; and the line which joins the points of contact passes through the focus.

4. Define tangent of an ellipse, and prove that the tangent of an ellipse is equally inclined to the focal distances of the point of contact.

5. The normal at a point P of an ellipse meets the major axis in G and the minor axis in G'; prove that

$$PG : PG' :: CB^2 : CA^2$$

6. The rectangles contained by the segments of two intersecting chords of a central conic are as the squares of the parallel semi-diameters.

7. If a perpendicular is drawn from the focus of a hyperbola on a tangent, the point of intersection lies in the auxiliary circle.

8. Prove, by Projection or otherwise, that in the hyperbola

$$NP^2 : AN \times NA' :: CB^2 : CA^2.$$

9. Define asymptotes of a hyperbola; and construct them geometrically when the hyperbola is given.

10. If an ellipse is defined as the section of a cone by a plane, find, by geometrical construction, the centre, foci, directrices.

11. If a circle is projected into a central conic, show that the diameters which are parallel to a pair of supplemental chords are conjugate to each other.

SECTION II.—ANALYTICAL CONICS.

12. Determine the equations to the straight lines passing through the origin, and making an angle of 45° with the line $ax + by + c = 0$.

13. Find the equations to the internal and external bisectors of the vertical angle of a triangle; and show

that the base is divided internally and externally by these lines into parts, the ratio of which is the same as that of the sides of the triangle.

14. What is the equation to the circle, passing through the origin and making given intercepts on the co-ordinate axes? find its radius and the position of its centre.

15. Define pole and polar of a circle. If the polar of the circle, $x^2 + y^2 = r^2$, is $Ax + By + C = 0$, what is the place of the pole?

16. The equation to an ellipse being $a^2 y^2 + b^2 x^2 = a^2 b^2$, find the lengths of the focal distances; and hence prove that $SP \times HP = CD^2$; that is, the rectangle contained by the focal distances is equal to the square on the corresponding conjugate semi-diameter.

17. Place analytically the theorems contained in 1, 3, 5, 7 of the preceding section.

18. Show that the equation $x^2 + y^2 = a^2$ represents a parabola, and indicate by a diagram its position relatively to the co-ordinate axes.

19. Determine the equations of the principal axes and of the asymptotes of the hyperbola

$$3x^2 + 2xy - y^2 + 4 = 0.$$

NAVIGATION AND NAUTICAL ASTRONOMY.

THREE HOURS ALLOWED.

Not more than one question to be answered in each section.

I.

1. Prove that the sides and angles of the polar triangle of a spherical triangle are respectively the supplements of the angles and sides of the primitive triangle.

2. The sides of the angles of a spherical triangle are proportional to the sines of the opposite sides.

3. Prove Napier's analogies.

II.

1. State Napier's rules for the solution of a right-angled triangle, and prove them when one of the sides is taken for the middle part.

2. Perpendiculars are drawn from the angles A, B, C of any triangle, meeting the opposite sides in D, E, F respectively; show that $\tan. B D, \tan. C E \tan. A F = \tan. D C \tan. E A \tan. F B$.

3. Having given two angles and side opposite to one of them, solve the triangle.

III.

1. Required the compass course and distance from A to B, given

Lat. A $7^{\circ} 18' N.$ Variation $1\frac{1}{4}$ pts. E. long. A $2^{\circ} 10' W.$

" B $2^{\circ} 5' N.$ Deviation $2^{\circ} 45' E.$ " B $2^{\circ} 10' W.$

2. A ship in lat. $37^{\circ} 5' N.$, long. $18^{\circ} 53' W.$, sailed as follows:—

K.10ths Courses.	Wind.	Leeway.	Variation.	Deviation.
59 5 S.S.W.	W.b.S.	Pts. $\frac{3}{4}$	Pts. $1\frac{1}{2}$ W.	$5^{\circ} W.$
53 6 N.W.	N.b.E.	" $\frac{1}{2}$	" "	$4^{\circ} 50' W.$
62 0 E.b.S.	N.N.E.	" 1	" "	$7^{\circ} 15' E.$

Required the lat. and long. in.

3. A ship sails in a great circle from a place lat. $18^{\circ} 10' N.$, long. $6^{\circ} 30' W.$, to another, lat. $25^{\circ} 27' N.$, long. $16^{\circ} 10' W.$ Find the lat. and long. of the vertex.

IV.

1. Dec. 1, 1865, the observed mer. alt. of η Draconis under the North Pole was $80^{\circ} 50' 30''$, the index error was $-1' 45''$, and the height of the eye above the sea was 19 feet. Required the latitude.

2. March 5th, 1865, at 4h. 59m. p.m. in lat. $40^{\circ} 48' N.$, long. $133^{\circ} 30'$ the obs. alt. of sun's L.L. was $9^{\circ} 46' 0''$ when she bore by compass S. $83^{\circ} 15' W.$ (ship's head S.S.W., Deviation $5^{\circ} W.$) Index error $+1' 30''$ and the height of the eye 20 feet. Required the variation.

V.

1. Prove that tan. course = $\frac{\text{Diff. long.}}{\text{Mer. diff. lat.}}$

Construct the figure for the following example—Given diff. long. $= 171' E.$; mer. diff. lat. $= 157' N.$, to find the course.

2. Explain a Mercator's chart, and show how to find the latitude and longitude of a place on it.

3. Show how to find the latitude and longitude of the vertex when a ship sails in a great circle from one point to another.

VI.

1. June 22, in lat. by account $20^{\circ} 16' N.$, long. $110^{\circ} 10' E.$, the following observations were made:—

Mean time nearly. Chronometer. Obs. alt. Sun's LL. True bearing.
9h. 30m. a.m. 2h. 39' 21" $54^{\circ} 52' 50''$ E.b.N.
2h. 13m. p.m. 7h. 22' 19" $58^{\circ} 46' 50''$ W.b.N.

The run of the ship in the interval was N.b.W. 28 miles, the index error was $+1' 15''$, and the height of the eye 16 feet. Required the latitude at the time of making the second observation.

2. Feb. 1, 1865, at 4h. 46m. p.m. in latitude $49^{\circ} 10' N.$, long. $4^{\circ} 20' W.$, the following observations were made:—

Obs. alt. Venus,	Obs. alt.	Obs. dist.
West of Meridian.	Moon's LL.	N.L.
$36^{\circ} 6' 40''$	$50^{\circ} 35' 0''$	$27^{\circ} 20' 0''$

Index error $-1' 15''$ $+1' 35''$ $-1' 15''$
The height of the eye was 17 feet. Required the longitude.

VII.

1. Show that the hour angle of a heavenly body = R. A. mean sun + ship mean time — R. A. heavenly body.

2. Prove the rule for finding the variation of the compass by an observed amplitude of the sun.

3. Prove that the error in the hour angle is least for a given error in the altitude when the sun is on the prime vertical.

VIII.

1. The arc of a sextant is divided into twice the number of degrees due to its length; explain by a figure the reason for this.

2. Describe the azimuth compass, and show how it is employed to observe the bearing of the sun.

3. Explain accurately all the ways you know by which the index error of a sextant may be obtained.

THE COMMITTEE OF COUNCIL ON EDUCATION.

A blue book has been published containing the report of the Committee of the Privy Council on Education to the Queen in Council for the year 1864.

During the year 1864, as compared with 1863, the number of schools, or of departments of schools under separate teachers, which were actually inspected, was increased by 588, and the number of children by 49,550. The number of certificated teachers was increased by 712. The number of new schoolhouses built was 92, comprising (besides class-rooms) 142 principal school-rooms, and 66 dwellings for teachers; 44 other schools were enlarged, improved, or furnished afresh; accommodation was created for 20,561 children, exclusive of the schools improved or newly furnished but not enlarged. The inspectors visited 11,818 daily schools or departments of such schools under separate teachers. They found present in them 1,133,291 children; 10,193 certificated teachers; 608 assistant teachers; and 11,712 apprentices. Of the schools or departments 2,231 were for boys only; 2,008 for girls only; in 5,139 boys and girls were instructed together; 1,550 were confined to infants (children under seven years of age); and 890 to night scholars. Of the children, 633,810 were males, and 499,481 were females.

The inspectors also visited 39 separate training colleges, occupied by 2,789 students in preparation for the office of schoolmaster or schoolmistress. In December last these students, and 1,757 other candidates, were simultaneously examined for the end of the first or second year of their training, or for admission, or for certificates as acting teachers.

Of the 26 reports on elementary schools by her Majesty's inspectors, which are included in this volume, two-thirds contain a decidedly favourable judgment of the working of the revised code, so far as relates to the change introduced by it into the mode of examination and payment. The less favourable judgments turn chiefly on observations of a tendency to neglect higher subjects of instruction, and to dispense with pupil-teachers.

Respecting the income of the training colleges, the committee observes:—"We cannot help noticing that out of an income (1864) of £121,241, to which the State contributed £96,166, for the support of the 39 training colleges inspected, only £41 18s. 10d. is returned as derived from collections in churches and chapels. If an annual sermon were preached in each church or chapel of the diocese, or religious communion, with which each college is connected, on behalf of its funds, these institutions would become better known to the public, and might obtain more general support."

WORKING MEN'S CLUB AND INSTITUTE UNION.

The annual meeting of this institution was held on Monday, 2nd inst., in the Lower-hall, Exeter-hall; Lord Brougham in the chair. The report, which was read by the secretary, the Rev. Henry Solly, stated that 41 new clubs and institutes had been established during the past year under the impulse and guidance of the union, which, added to the number previously established, made a total of 116 clubs formed by the union during about two years and a half of active operation. From a return which had been received from about half of the clubs in the kingdom, it appeared that they numbered 14,667 ordinary members and 958 hon. members—the average number of members to each club being 228 ordinary and about 13 hon. members. Therefore if the remaining 70 or 80 societies which had not sent in returns contained about the same number, there would be a total of about 30,000 ordinary and nearly 2,000 hon. members in the clubs and institutes of Great Britain. Throughout the country and in the metropolis new clubs were being organised, but in South London and Bethnal-green, where they were pre-eminently needed, greater difficulty and delay in forming them had been experienced than in almost any part of the country, mainly owing to the want of resident local gentry. The financial statement showed the receipts, including balance of £92, and donations £1,125, to amount to £1,609, and the expenditure to £1,470, leaving a balance of £139 in hand. The meeting was addressed by Lord Lyttelton, Lord Ebury, Mr. Layard, M.P., Dr. Bowkett, Mr. Bainbridge, Mr. Vyse, Mr. Marriatt, and others, and resolutions were passed adopting the report, re-electing the officers, acknowledging the importance of the operations of the union, and appealing for increased and more regular public support.

At the conclusion of the business, Lord Brougham said that the object of this important movement was to give to the working man an opportunity of combining amusement with his work, and spending one or two of his spare hours in the evening in a manner which, whilst harmless, would prove highly profitable to himself. A working man, by the establishment of these clubs, was relieved from the necessity, which in many cases was a most disagreeable one, of having company at his own home, where he could ill accommodate a friend for an hour, as he could now, without the slightest inconvenience, enjoy the conversation of his fellow workmen and the amusements which were there provided for him. A friend of his from Carlisle had stated

that the working men's club at that place had proved a failure, but he (the noble lord) had discovered that the failure was consequent upon the club taking simply the form of a reading room. A reading room was undoubtedly an excellent thing, but the other characteristics of a club must be joined with it to render it successful. It had been said that there was a slowness on the part of the working men to join the clubs, but that, he thought, must arise from the fact that they had not had their operations and advantages sufficiently explained. He was certain that if that were clearly and properly done, the working men would not be slow to take advantage of the suggestions offered to them. A great change had taken place during late years, beginning at Rochdale and extending over Lancashire and Yorkshire; in fact, over the greater part of the north of England—he meant the system of co-operation, which was now becoming such a great power in this country. The co-operative system was most important to the working man, inasmuch as it tended to better his position in every respect, and he had no reason to suppose that the working classes themselves would not look upon it in that light, and that the clubs and institutes which had been established would not be warmly supported by them.

A vote of thanks having been accorded to the noble lord, the proceedings terminated.

Manufactures.

SILKWORM DISEASE IN FRANCE.—An error occurred in the notice on this subject in the *Journal* of the 30th of June, page 542. In the report in the *Moniteur* the quantity of eggs or seed required annually in France was incorrectly given; the actual quantity required annually is thirty thousand kilogrammes, or thirty-three tons.

ANOTHER NEW KIND OF WRITING-INK.—M. Mathieu Plessy, of Paris, manufacturer of pyrogallic acid for photographic purposes, has invented a new ink, which is said to be composed of a mixture of the products of his factory with the colouring matter of dye woods. It is said to possess all the qualities of the best ink, and to be entirely free from their common faults, not liable to form deposits, or to become thick and mouldy, to flow with great freedom, and to dry on the paper almost instantaneously.

PUBLIC WORKSHOPS FOR ARTISANS.—At a recent weekly sitting of the St. Marylebone Vestry, an important discussion arose, on a motion by Dr. Richardson, to invite all the other metropolitan vestries to elect two members each, with their medical officer of health, to consider the desirability of taking steps for the erection of public workshops in the various parishes, for the accommodation of artisans, who at present worked in their own small and crowded houses and rooms, and as to the propriety of obtaining an Act for the establishment of such workshops, similar to the "Baths and Wash-houses Act."—Dr. Richardson said he had brought forward this subject on sanitary, moral, and social grounds. With respect to the first, he was prepared to prove that epidemics were frightfully increased, and even introduced, into families of the upper classes, through clothes being made in crowded rooms, where fever prevailed. Many poor men, overwhelmed with debt, were unable to provide proper places for their labour, and consequently could not do their work in a proper manner, whilst others had no conveniences for pursuing their avocations at all.—Mr. Filmer opposed the motion, on the ground that, though the proposal might be an excellent one, brought forward as a public institution, or started by a limited liability company, he really thought it was one quite beyond the province of a parochial board.—After some further discussion, the motion was negatived.

THE COLOGNE EXHIBITION.—The following is a list of prizes and distinctions awarded to British exhibitors:—To the Fowler's Steam Plough Company (Limited), the

first prize of £150, for the best steam plough, and £75 for the best traction engine; to Messrs. Mereweather and Sons, London, the first prize of £75, for the best steam fire engine; to Messrs. Shand and Mason, London, a gold medal for ditto; to Messrs. Clayton and Shuttleworth, Lincoln, a gold medal for steam engine and threshing machine; to Messrs. Hornsby's, of Grantham, gold medal for ditto; to Messrs. Ransomes and Sims, of Ipswich, gold medal for ditto; to Messrs. Garrett and Sons, Leiston-Saxmundham, gold medal for ditto; to Messrs. Smyth and Sons, Peasenhall, gold medal for drills; to Messrs. Russell and Sons, Wednesbury, gold medal for tubes. The jurors also award silver medals to the following firms:—Robey and Co., Lincoln, for threshing machine and engine; Bentall, of Heybridge, for chaff machines, &c.; Mr. Kent, London, for domestic contrivances; Mr. Nicholson, of Newark, for horse rake; Messrs. Furness, Ipswich, for steam engine, threshing machine, and mills; the Reading Iron Works, Reading, for steam engine, threshing machine, and horse works; Mr. Robert Boby, Bury St. Edmunds, for patent self-cleaning corn screens, and for patent double-action haymaking machine; Ruston and Proctor, Lincoln, for steam engine and threshing machine; Burgess and Key, London, for reaping machine; Messrs. Samuelson and Co., Banbury, for mowing machines; Woods and Cockedge, for bean mill. Bronze medals are awarded to Messrs. Webb and Sons, Stowmarket, for the best leather driving bands; to Powis and Co., London, for steam sawing machinery; to Barrett and Co., Thirsk, for reaper; to Kemp, Murray, and Co., Sterling, for reaper; Gwynn and Co., London, for centrifugal pumps. Honourable mention to Mr. Goodchen, Worksop, for threshing machine-beaters. This list, in which almost all the first and most important prizes awarded in the agricultural machine department are included, shows sufficiently that Great Britain still maintains her superiority over the rest of the world in this department.

Commerce.

CHEMISTS AND DRUGGISTS.—The following is the report of the select committee of the House of Commons to whom were referred the Chemists and Druggists Bill, and the Chemists and Druggists (No. 2.) Bill:—“Your committee have examined witnesses on the general questions raised by the provisions contained in the two bills committed to them, and have heard evidence in support of the Chemists and Druggists (No. 1.) Bill. Your committee then passed the following resolutions:—1. That no compulsory examination or registration under the bills referred to the committee should be required of persons now carrying on the trade of chemists and druggists. 2. That the bill do provide that no other person shall, after a day to be fixed by the bill, sell certain dangerous drugs, to be scheduled in the bill, unless he shall be examined and registered. By the adoption of the second resolution as an amendment to a proposal that persons compounding medicines from the prescriptions of medical men should also be examined, your committee decided against the principal provision contained in the Chemists and druggists (No. 1.) Bill, and they accordingly resolved to proceed with the Chemists and Druggists (No. 2.) Bill. After several clauses of the bill were passed, considerable difficulty arose in providing for the first formation of the council to which the duty of regulating the examination of chemists and druggists was to be intrusted; and your committee, considering the advanced period of the session, were compelled to abandon the expectation of any useful result from a further consideration of the bill. Having, therefore, disposed *pro forma*, of the remaining clauses, they came to the following resolution:—“That inasmuch as there appears to be little prospect of any satisfactory termination to the labours of the committee in the present session, it is desirable that the evidence, so far as it

has been already taken, and the proceedings of the committee, be reported to the house, accompanied by a recommendation that the government should, early in the new parliament, bring in a bill on the subject referred to the committee. Your committee have in conclusion to report that, in their opinion, it is not expedient to proceed further with either of the bills which have been committed to them.”

Colonies.

RAILWAYS IN VICTORIA.—The expressed intention of the Government to lease the Victorian railways as soon as they should have received sufficient information from home to enable them to see their way clearly, is the natural result of the expensive manner in which the aerial trunk lines have been executed. Similar extravagance seems to have prevailed in New South Wales. Instead of starting, as would appear reasonable, from the head of the river navigation, the only two lines at present in working order from Sydney to Newcastle, lie, for the greater part of the way, side by side with a navigable tideway, and the available money has been already nearly exhausted at the time they have run themselves to a stand still among the intricacies of the Blue Mountains. It is difficult to say what number of years may be requisite to carry the Goulburn and Penrith lines effectually across the highlands into the level of Riverina. The actual cost of the Great Southern Railway from Parramatta Junction to Picton, and estimated cost from Picton to Goulburn, are given at £1,397,799. The actual cost of the Great Western Railway from the Parramatta Junction to Penrith, and estimated cost from Penrith to Bathurst at £146,852; sums which are indeed at a reduced rate from those of Victoria, but which New South Wales has far less power of meeting. The case of Victoria is not so desperate, but it is more owing to the facilities of the terrain than any superior wisdom. If the pass through which the line reaches Sandhurst had presented the same natural difficulties as the tangled precipices beyond Picton and Menangle, the terminus would never now have rested on the Murray. As it is favoured by the fortunate depression in the dividing range, it has reached both Echuca and Ballarat, but at a cost of eight millions. Against £404,808 which is set down as interest for the loan, and £116,912 working expenses, collectively £521,720, the receipts for the year 1864 amounted to £480,332, showing a deficiency of £41,388. A colonial journal says:—“Experience has shown that Government railways are exposed to the same encumbrances which make the greater number of public undertakings far more expensive than private ones. Paid officials at fixed salaries will never work as efficiently and cheaply as individuals whose profit depends upon their success. They likewise offer an enormous field for political jobbery.”

COTTON CULTIVATION IN QUEENSLAND.—It is now become a general belief that cotton will thrive best when grown on land which has been a few years under cultivation, and that it is not the best crop to put in new ground. One of the principal growers in this colony has left a considerable quantity of his last year's crop of Sea Island in, to test the opinion generally expressed—that there is no need to sow every year, but so far he is not content with the result. He is of opinion that the time saved in planting is not equivalent to the great advantage of loosening and turning the soil, which is, of course, impossible when the plants are left in the ground. He has about fifty acres altogether under crop, and he hopes not to have less than a bale per acre. This is the last season that the larger sum of £10 per bale premium is given by Government, but is to be hoped that this will be extended another season or two. The Manchester Queensland Cotton Company has cleared 344 acres, of

which 121 acres are under New Orleans cotton, which looks well and promises to yield a good crop. The area under Sea Island consists of 33 acres, of which 15 are plants of last year, which have been pruned. These are loaded with bolls, and the quality is fully equal to that sold last year at 4s. 6d. per lb. Three bales have already been picked, and it is estimated that the yield will average one bale per acre. The total area under cultivation is 154 acres, not quite so many as last year, but promising much more satisfactory results.

FISH IN VICTORIA.—The extent of the Victoria fishing ground is immense. In Port Philip Bay there is an area of over 700 square miles, with a coast line of about 130 miles, well supplied with fish; and in Western Port Bay about 300 square miles, one immense fishing ground, and still more plentifully supplied with better fish, and with a coast line of 120 miles, including French and Phillip Islands. Both bays are landlocked, and in every way favourable for fishing. The following are the descriptions of fish found in these bays. Schnapper, from 2 lbs. to 20 lbs., even 30 lbs.; rock cod, flat head, garfish, whiting, silver fish, mullet, gurnet, ling, perch, mackerel, butter fish, 10 lbs. to 20 lbs.; salmon trout, white salmon, bream, plaice, flounders, and kingfish, also crayfish, shrimps, and oysters. There is one immense bank, extending south and east from the eastern entrance of Western Port, swarming with schnapper, rock cod, and other fine fish, that would of itself, even as far as now known, supply a large fishery. It has been ascertained that the banks extending to the eastward of King's Island, Rabbit Island, and Dorner Inlet, besides butterfish, jewfish, and others, abound in flounders of large size and of the finest quality; and as the straits average less than 45 fathoms, and with much sand and shell bottom, most favourable for trawling, it is only requisite to have proper boats to give as ample a supply in winter as in summer.

MINES IN SOUTH AUSTRALIA.—There are now seven working mines on the peninsula, nearly all of which may be said to be paying mines, viz., Moonta, Wallaroo, New Cornwall, Yelta, Karkarilla, Kurilla, and South Wallaroo. The Moonta is probably the richest mine in the world, standing almost unrivalled for the richness of its mineral deposits. It is stated that the monthly produce of ore varies from 1,500 to 1,800 tons, worth at least 20 per cent. of pure copper. Very rich black ore is also being raised from the mine, besides sulphides and carbonates of various per centages. Next in importance stands the Wallaroo mine, near Kadina, the quantity of ore raised from which nearly equals that of the Moonta, but the quality is inferior by 5 to 7 per cent. A large accession of strength has lately been received at this mine, sixty men, with their families, having just arrived from England.

SHEEP-FARMING IN VICTORIA.—Opinions are said to be changing as to the feeding capabilities of this country, and this principally because of the fencing and subdividing so many sheep-runs, as well as of the necessity for keeping small flocks by farmers on limited spaces of ground. Where the old system of shepherding on the open pasture is still followed there has been little or no improvement in this respect, but even by fencing alone the feeding capabilities of any tract of land are vastly increased. When driven to-and-fro in large numbers, the sheep trample under foot and destroy as much as they eat, and much of the food they do get is wasted in the exertion of walking much further than they otherwise would, and, when grass is scarce, in racing a-head for the little that is to be picked up, and when allowed to follow their own inclination, as they are within fences, there is no hurry or racing, no more travelling than is actually necessary, and little or no grass is so trampled upon as to be wasted. The loss from driving alone, even by the most careful shepherds, is considerable, and should not be overlooked in calculating the advantages of fencing-in a run. Thus, in estimating these the saving of wages is but a trifling benefit gained in comparison with the saving of grass and

the consequent increase in the number of sheep the same extent of ground will keep. The grazing capabilities of many of the runs have been doubled by fencing alone; land which before only kept one sheep to two acres, is now a sheep per acre, and keeping them in better condition throughout the year, while on limited portions of the best land, well subdivided, even two or three sheep to the acre are kept all the year round, or nearly so, and this on the natural grasses, improved only by the long feeding down and manuring of the sheep kept thereon. The gradual introduction of English grasses and clover has helped materially, in places, towards this improvement, but these do not spread much except when the land has been broken up.

Obituary.

ANTOINE JOSEPH WIERTZ, painter, sculptor, and writer, born at Dinant, in Belgium, in 1806, died at Brussels last week. He was a pupil of Van Brée, and won the grand prize of the Belgian Academy in 1822. He executed a large number of large historical works of importance, and wrote, amongst other things, "Memoirs of the Life of Rubens."

NILS ANDERSON. Professor of Painting in the Academy of Stockholm, died recently at the age of forty-six. He studied for some years under M. Couture, of Paris, and afterwards founded a school in Stockholm, which has produced many distinguished painters.

Publications Issued.

L'ASTRONOMIE AU XIX^{ME}. SIECLE. Par M. A. Boillot. 1 vol., 12mo. (*Paris: Didier and Cie.*) A carefully executed history of the progress of astronomical science from the earliest period to the present day, by a mathematical professor who is also scientific editor of the *Moniteur Universel*, and contained in a single volume of small size. The work is intended for general readers, contains all the principal facts relative to the subject which it treats, is clear of technicalities, is written in a lucid, pleasing style, and exhibits the utmost impartiality in treating of the labours and discoveries of the astronomers of foreign nations. In fact the English element is very prominent in M. Boillot's book: he not only does full justice to Newton, Flamsteed, Halle, Bradley, Captain Cook, the Herschels, Hind, Airy, Nasmyth, Lord Rosse, and other Englishmen, but the entire volume shows that M. Boillot is very conversant with both the literature and science of our own country. The first chapter contains a short sketch of the labours and notions of the old astrologers, which will be very welcome to the general reader. Of Newton, M. Boillot speaks with the greatest enthusiasm:—"The great Newton, the creative mind, the precise thinker, and fruitful genius, meditating on Kepler's law and on the special movements of the moon, was dissatisfied with the result with which the science of his day furnished him. He saw that the force then called weight or heaviness might well extend to the moon, and he verified the truth of his idea. His mind, stimulated by this first success, assumed increased activity, and finished by dissipating all the clouds that had obscured the view of the grandest scientific discovery that was ever made—the principle of universal attraction." The chapter which records the services that have been performed for astronomical science by the combined efforts of the Observatories of Paris and Greenwich, aided by the astronomers of other countries, during the last ten years, and the observations on the consequences of the spectral analysis, are full of interest.

ANNUAIRE DE L'ECONOMIE POLITIQUE ET DE LA STATISTIQUE. By Maurice Block. 1865. (*Guillaumin and Cie, Paris.*)—This modest annual, now in its twenty-

second year, contains a vast amount of information, well arranged and well printed, in a handy form, and at a moderate price. It is divided into four parts, the first treating of France in general, the second of Paris in particular, the third of Algeria and the colonies—a new feature, introduced for the first time this year—and the fourth of foreign states, besides supplementary matter. The wonderful changes which the city of Paris and the Department of the Seine have undergone during the last twelve or fifteen years, and which are still in progress, give a peculiar interest to that portion of the work which treats of the metropolis. We find the ordinary receipts of the municipality for 1864 set down at very nearly a hundred and twenty millions of francs, and estimated for the current year at rather over a hundred and thirty millions of francs. The principal items are the following:—Octroi duties, paid at the barriers of the city on articles of ordinary consumption such as food, wine, oil, fuel, &c., upwards of eighty-eight millions; market dues, nearly eight millions; water-works, five millions and a half. In addition there are further ordinary, supplementary, and extraordinary receipts, making up the grand total revenue of the municipality to upwards of one hundred and fifty-five and a half millions. The estimates are made to balance, so that the same sum represents the expenditure. The population of the city was, in 1861, 1,696,141, and the annual increase since, about 7,500 per annum, making a total of rather less than a million and three-quarters for the current year. If we divide the gross total of the above estimate by the total number of the inhabitants of Paris, we find that the expenditure is equal to rather more than eighty francs, or full £3 11s. per head. In the year 1863, the total of all expenses—ordinary, extraordinary, and supplemental—amounted to very nearly two hundred and ten millions of francs, or, on an average, very nearly £5 per head. These figures are derived from the published reports of the Prefect of the Seine, and it must be remembered that they represent the municipal expenditure alone, exclusive of the general taxation of the empire. The ordinary expenditure of the current year is set down at equal to £3,385,845, the principal items being, in round numbers:—Annual interest on municipal debt, £537,150; expenses of the prefecture and twenty mairies, £124,000; collection of octroi dues, £310,000; National Guard, Gardes de Paris, &c., nearly £120,000; charitable institutions, £411,879; primary instruction, £178,924; survey and plan of Paris, £69,436; roads and quarries, £679,176; water and sewers, £103,288; promenades and plantations, £115,440; police, £495,573. The extraordinary and supplementary expenditure is estimated at equal to £2,837,756, of which sum £412,596 is devoted to further interest and charges on the city debt, and the greater portion of the remainder to the improvements and embellishments of the capital, the reconstruction of the abattoirs, and the completion of the roads and other works in those parts of the former *banlieues* which now form integral portions of the city. As regards the amount of indigence in Paris, the returns make a very satisfactory appearance. In 1832, it seems there was one person receiving public assistance to every 11·16 of the population; in 1838, it had fallen to one in 15·37; between that period and 1847 it had risen again to one in 13 or 14; in 1850, it had fallen to one in 16·38; and in 1851 it was only one in 18·47. The total number receiving relief in that year was 101,570, and the sum distributed was equal to £168,000, of which one-fourth was derived from testamentary and voluntary contributions. Deducting from this total the amount expended in medical assistance rendered at the homes of the poor, it appears that on an average each person relieved received about 27s., or three times as much as the average in the tenth year of the first republic. The number of houses demolished and constructed during the twelvemonth ending with September, 1864 in Paris, was as follows:—1,383 demolished, of which 271 were in consequence of municipal improvement, and 3,098 erected,

leaving a balance of 1,715 houses, or 15,676 sets of apartments, number corresponding to a population of about 45,000 persons. The total increase in the number of apartments created, by demolition and reconstruction, to September last is given at 629,421, by far the larger portion being in the new or outlying districts of the city, such as those of Popincourt, the Gobelins, the Observatory, Vaugirard, Passy, Batignolles, Montmartre, the Buttes Chaumont and Menilmontant. The chapter relative to Algeria and the colonies informs us that the European population of Algeria, which only numbered 700 in 1830, had risen to 37,374 in 1841, and to 213,061 in 1863; in the year 1862 the French subjects numbered 118,804, and the natives of the European States 86,073; but the per centage of increase is in favour of the latter, although the actual increase is slightly on the side of the French immigration. The French army in Algeria amounted in 1861 to 63,786, and the civilians employed, and not included in the general population given above, to 13,140, or together equal to about 40 per cent. of the colonial population. At the same period the native population was about five millions and a half. As regards commerce the returns are not encouraging, for the total of imports and exports had fallen from 167 millions of francs in 1858 to less than 139½ millions in 1862. There was, however, an increase of about 40 per cent. in the exports of 1863, with a slight diminution of the imports. A comparative table of the mercantile marine of the world will be interesting to English readers. It appears that while in Belgium there exists but one ton of shipping for every 162 inhabitants, the ratio in France is 1 in 38; in Spain, 1 in 18·4; in Sweden, 1 in 9·9; in the United States, 1 in 6·1; in England and in Holland, 1 in 5·5; in Greece, 1 in 4; in Norway, 1 in 2·1; in Hamburg and the three Free Cities, 1 in 0·9; and in Bremen, 1 in 0·6.

Forthcoming Publications.

ART FOLIAGE. By James K. Colling, F.R.I.B.A.—The work will be divided into three parts, and consist of—1. An analysis of form, being a selection from the best and most useful geometrical ornaments, which have been used for decoration in the various periods of art, and in different parts of the globe, with an analytical description and comparison of their various combinations. 2. A series of studies from natural foliage—in the branch, the bud, the leaf, the flower, and the fruit—accompanied by letter-press description and wood-cuts. 3. A series of original designs for foliated enrichments suited to the various branches of the ornamental arts, including stone and wood carving, painted decoration, inlaying in wood, stone, and marble, wall papers, metal work, &c., accompanied by a detailed description of each plate, explaining the sources from which the designs have been derived, and an endeavour to elucidate the principles which should guide the artist in designing from nature; the primary object being to show how natural form was idealised by ancient and mediæval artists, and in what manner the same sources may be again appealed to, to gain new beauty and fresh inspiration.

Notes.

THE PHILADELPHIA SKETCH CLUB offer a prize of 2,000 dollars for the finest work of art illustrative of the great American rebellion. Contributors must be, at the time that they send in their contributions, residents of the United States.

FRENCH ACADEMY OF INSCRIPTIONS AND BELLES-LITTRES.—The numismatic prize of this Academy, founded by M. Allier de Haüterroche, has been awarded to Mr. John Evans, for his work, published last year in London, on the coins of the Ancient Britons.

PARIS UNIVERSAL EXHIBITION OF 1867.—The *minimum* amount of guarantee having been subscribed for, the Imperial Commission has added nineteen members to its body, as representatives of the guarantors provided for in the original decree. The list includes several names well known in the financial and industrial world, as, for instance, Messrs. E. Perière, P. Talbot, the Duc d'Albufera, Baron James de Rothschild, Sallandrouze de Lamornaix fils, Desfosses, and Halphen.

GREAT PRIZE IN VOLTAIC ELECTRICITY.—The French Government has just announced the renewal of the grand prize of 50,000 francs to be given, in five years' time, to the author of a discovery which shall render the voltaic pile economically applicable as a source of heat, as a means of lighting, or otherwise, in chemistry, mechanics, or medicine. This prize was awarded, in September last, to M. Ruhmkorff, for the well-known apparatus which bears his name. In case no invention deemed worthy of the honour should be brought forward within the time specified, the period may be prolonged for another five years by decree. The prize is, we believe, open to all the world, but it is not so stated.

COST OF GREAT DRAINAGE WORKS.—In consequence of the terrible disasters which occurred in 1856, when the whole of the great basins of France were inundated, a careful inquiry and surveys were made, and in 1858 a law was passed for the carrying out such works as should insure the towns which had suffered most against future inundations. Works have been executed with that view in forty-five towns, at an outlay of twenty-two millions of francs, or £880,000. As regards the great valleys, the Imperial Government appointed an inspector-general for those of the Seine, the Loire, the Rhone, and the Garonne, and the result of all the surveys and inquiries that have been made was made known to the Corps Legislatif by M. Franqueville, the government commissioner, in the following words:—"Are you aware, gentlemen, what it would cost to reduce the level of the waters in these valleys, say two or three feet, during great inundations? For the valley of the Loire it would require eighty-five reservoirs, which would cost a hundred millions of francs (four millions sterling), and the same for that of the Rhone. We have not dared to undertake such an enterprise, to ask the country to make such sacrifices in order to prevent a misfortune that only occurs two or three times in a century." The valley of the Rhone was inundated in the years 1840, 1841, and 1856, and that of the Loire in 1846 and 1856. The opinion of those who have inquired into the subject is that such inundations cannot be attributed to any changes that may be made in the quantity or distribution of timber in the localities, but that the facts observed during eight or ten centuries prove that they are the result of a concurrence of a certain number of atmospheric circumstances which fortunately happens but seldom. Another conviction forced upon the Government engineers is that the plans proposed are of very questionable efficiency, and upon this head a report is promised of the results of all the examinations that have taken place under the general council of engineers having charge of the roads and bridges of the empire.

LOCAL RAILWAYS.—A very important problem, that of branch railroads connecting small places with each other, and with the main lines, is being resolved in France. The honour of the initiative belongs to the department of the Bas-Rhin, whose Conseil-Général, in 1858, came to the determination that it was desirable to create a second series of roads uniting the principal places in each commune, and to offer these to companies or local speculators for the formation of railroads. There was, however, considerable opposition, one party objecting that the funds of the road trust, as it would be called in England, could not properly be applied to the formation of roads to be converted into railways, and another, that local railroads were the mere dreams of theorists. Last year, however, the project obtained the support of the Ministers of State and of Agriculture, M. Rouher and M. Behic, who supported

the proposal in the Conseils-Généraux of the Puy-de-Dôme and of the Bouches-du-Rhône. The prefect of the Bas-Rhin had, in the meantime, pushed forward his scheme, and in 1859 he obtained the sanction of the departmental authorities. He then opened up correspondence with the Great Eastern Railway of France, but the negotiations ended in nothing, and it was determined to form local companies for the purpose, and in 1861 a supplementary tax of twenty-six centimes (about a shilling in the pound), extending from 1861 to 1871, was made for the special purpose, and the work was commenced. On the 25th September, 1864, the first of these departmental lines, about forty-seven miles in length, was opened for traffic. The government recognised the importance of the new movement, the ministers of the interior and of commerce determined on framing a special law upon the subject, and a commission issued from the office of the latter minister to collect full information upon the subject. The example of the Bas-Rhin was soon imitated by its neighbour, the department of Haut-Rhin, in which a line from Haguenau to Niederbroum was opened on the 18th, and another from Sainte Marie-aux-Mines to Schelestadt on the 29th of December last. The department of Sarthe has voted the means for carrying out three such local lines. Ain, which is very badly off as regards railway communication, is now engaged on the question; and several other departments have adopted the idea and are now occupied with its realisation. In that of the Seine-inférieure surveys are being made for a line to connect St. Valery-en-Caux with the Rouen and Havre railway, and which is intended to form part of a complete system which will unite the whole of the small places on that coast with the trunk line in question. The results, in a financial point of view, can only be guessed at by the short experience of the line in the Bas-Rhin; this road was opened for passengers on the 25th of September, and for heavy traffic, in part, on the 24th October, and completely on the 29th December last, when the weather was very bad, and the conditions consequently disadvantageous. The total receipts, from the 27th September to the 31st December, were equal to £2,939, or, on an average, of £320 for little more than $\frac{1}{6}$ of a mile. The profit resulting is given at 2,000 francs per kilomètre, or about £130 per English mile. The nature of the traffic is a very important question. The Barr line has fifteen stations, that is to say, one for each commune; this was used by 70,000 persons, who paid a total of 60,293 francs, or, on an average, 86 centimes per passenger. This is tolerably conclusive evidence that the traffic of the line was eminently local and independent of the general railway traffic of the country. There is another proof in the fact that the total of arrivals and departures at the station of Strasbourg, on the main line, during the same period, was only 47,768, which leaves 22,232 for the purely local circulation, without taking into account those which may have travelled for local purposes between the chief town and intermediate stations on the trunk line. It is not intended that great speed should be attained on these local lines, and therefore the question of curves and gradients becomes of smaller importance. In the Haute-Marne the minimum radius is fixed at 250 mètres; in the Indre it has been set at 300. The inclines adopted in the Haute-Marne vary from 0.02 to 0.018 per mètre. Lastly, some of the local lines will be worked by horses, while the engines and carriages employed on the others are of a smaller and less costly kind than those used on the main lines. In the Bas-Rhin the expense of the new roads has been 45,000 francs per kilomètre, while it has cost the Great Eastern Company, which has become the concessionaire of the line, 60,000 francs per kilomètre to convert the new roads into railroads and provide machinery and material. Thus the total cost of these local lines may be taken roughly at an average of 115,000 francs per kilomètre, while the Paris and Orleans cost 368,000 francs, and the Rouen line 404,000 francs per kilomètre. It is not easy to exaggerate the results which may arise

from the complete carrying out of this system of rural railways, and any fact connected with it is of importance.

PARLIAMENTARY REPORTS. SESSIONAL PRINTED PAPERS.

- Par. Num. *Delivered on 17th and 19th June, 1865.*
209. Bills—Local Government Supplemental (No. 5).
 217. " Record of Title (Ireland) (as amended in Committee).
 218. " Poor Law Board Continuance, &c. (as amended in Committee).
 219. Peace Preservation (Ireland) Act (1856) Amendment.
 220. " Salmon Fishery Act (1861) Amendment (as amended by the Select Committee, and on Re-commitment).
 221. " Sewage Utilisation—Lords Amendments.
 222. " Pier and Harbour Orders Confirmation (No. 2) (as amended in Committee).
 223. " Pier and Harbour Orders Confirmation (No. 3) (as amended in Committee).
 224. Carriers Act Amendment.
 66 (x). Railway and Canal Bills—Eleventh Report of the General Committee.
202. County Treasurers—Abstract of Accounts.
 266 (ii). Oaths and Declarations—Returns.
 321. Freeholders (Ireland)—Return.
 351. Rivers Pollution—Commission.
 354. Education (Ireland)—Annual Report.
 364. Revenue and Expenditure—Statements.
 366. Vessels not Armour-Plated—Return.
 387. Iron-Plated Ships and Batteries—Return.
 371. Advances for New Courts of Justice and Offices (1865-66).
 372. Navy—Supplementary Estimate (Greenwich Hospital).
- Delivered on 20th June, 1865.*
216. Bills—Harbours Transfer.
 226. " Turnpike Trusts Arrangements.
 226. " Colonial Docks Loans.
 227. " Turnpike Acts Continuance.
 145 (1). Tithe Commutation—Further Return.
 322. Grand Jury Presentments (Ireland)—Abstract of Accounts of Presentment.
 Abyssinia—Papers relating to the Imprisonment of British Subjects.
 Canada—Papers relating to the late Conference.
- Delivered on 21st June, 1865.*
229. Bills—Sheep and Cattle—Lords Amendments.
 230. " Fire Brigade (Metropolis) (as amended in Committee).
 315. Elmswell, &c., Schools—Return.
 362. Vessels and Tonnage—Return.
 366. Coals (Woolwich and Portsmouth)—Return.
 North America, No. 6 (1865)—Correspondence respecting the Cessation of the Civil War.
 North America, No. 7 (1865)—Correspondence respecting the Proclamation issued by the President.
 New Zealand—Further Papers (2nd June).
 Spain and France—Correspondence respecting alleged Commercial Negotiations.
- Delivered on 22nd June, 1865.*
228. Bills—Comptroller of the Exchequer and Public Audit (as amended in Committee).
 331. Shipping—Return.
 353. New Ross Union, &c.—Returns.
 379. Dockyards and Steam Factories—Return.
 389. Thames Embankment—Correspondence.
- Delivered on 23rd June, 1865.*
233. Bill—Compound Spirits Warehousing.
 234. " Indemnity.
 235. " Expiring Laws Continuance.
 378. Registry of Deeds Office (Dublin)—Returns.
 386. Waterford and Limerick, &c., Railways—Return.
 392. Civil Service Estimates—General Abstract.
 393. Referees on Private Bills—Report from the Select Committee.
- Delivered on 27th June, 1865.*
352. Capital Offences (Ireland)—Return.
 363. Land Tax—Returns.
 385. Treasure Trove—Return.
 369. Thames Embankment—Correspondence.
 393. Referees on Private Bills—Report and Evidence.
 402. Tenure and Improvement of Land (Ireland) Act—Report from the Select Committee.
409. Constabulary (Ireland)—Contract.
 411. Mont Cenis Railway—Report from Captain Tyler, R.E.
 Western Australia and Tasmania—Annual Reports on Convict Establishments.

Patents.

From Commissioners of Patents Journal, June 30th.

GRANTS OF PROVISIONAL PROTECTION.

Artificial fuel—1600—C. J. Collins.
 Bottles and stoppers—1570—H. B. Fox.

- Boilers, multitubular—1614—H. Ormson.
 Buildings, partitions, roofs, &c., of—1598—J. J. Bodmer.
 Carriages, break for—1604—J. Griffiths.
 Carriage windows, arrangements for opening and shutting—1613—S. Courtauld and C. W. Atkinson.
 Coal, &c., machinery for compressing—1606—H. G. Fairburn.
 Collars and cuffs, machine for curling or curving—1589—G. Speight.
 Cotton-spinning—1574—J. de Hemptinne.
 Doors, and windows, &c., fastenings for—1578—G. E. Meek and W. H. Howes.
 Doors and windows, apparatus for maintaining in position when open, and for securing when shut—1581—A. H. Gilmore.
 Fibrous materials, apparatus for printing—1580—J. Henderson.
 Fibrous substances, preparing and spinning—1565—S. Stell, T. Broughton, and R. Hunter.
 Furnaces—1590—R. A. Broome.
 Fire-arms, breech-loading—1562—J. R. Cooper.
 Frames for looking glasses—1564—H. Hunt and R. Hunter.
 Fuses for shells for ordinance—1595—G. Haseltine.
 Gas, purification of—1591—J. Thomas.
 Hammers, steam—1607—B. and S. Massey.
 Iron and steel manufacture, apparatus used in—1506—H. Allman.
 Iron ships, sheathing—1612—W. R. Mulley.
 Kilns for firing porcelain—1582—R. A. Broome.
 Leather and fabrics, ornamenting—1389—W. Clark.
 Locomotive engines, &c.—1601—J. H. Johnson.
 Metals, machinery for cutting—1571—W. W. Hulse.
 Paper manufacture—1602—T. Routledge.
 Paper manufacture—1596—J. A. Millington and A. Allnutt.
 Paraffin, purifying—1586—G. E. Poynter.
 Phthalic acid and chloroxynaphthalic acid—1605—F. A. Laurent and J. Castelaz.
 Railway signals—1603—E. S. Horridge.
 Rocks, cutting and excavating—1587—G. Haseltine.
 Safety valves—1575—C. Vernon and W. Hodgkins.
 Sewing machines—1566—J. Draper.
 Sewing machines—1584—J. Glazebrook and M. N. and B. R. Mills.
 Sewing machines—1592—J. Hayes.
 Sewing machines—1611—G. E. and J. Keats.
 Ships, sheathing the bottoms of—1567—B. S. Cohen.
 Splints for fractures—1597—C. A. Hemingway.
 Steering apparatus for ships and vessels—1577—W. H. Harfield.
 Ships' cables, apparatus for stopping and easing—1608—C. de Ven-deuvre.
 Tea, firing and curing—1594—A. Robinson.
 Traps for rabbit-catching—1375—R. T. Birt.
 Wickets for the game of cricket—1478—W. H. Stanley.
 Wood, impregnating with various substances—1673—W. E. Gedge.

INVENTIONS WITH COMPLETE SPECIFICATION FILED.

- Nails for horse-shoes—1693—P. A. le Comte de Fontainemoreau.
 Sewing machines—1678—G. Haseltine.

PATENTS SEALED.

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| 15. L. D'Aubréville. | 42. J. Lebaudy. |
| 17. L. Goldberg. | 61. T. Horrex. |
| 18. G. Hodson and J. Pitt. | 83. H. Coutanche. |
| 23. W. Ager. | 101. F. Barnes, D. Hancock, and E. Cowpe. |
| 24. D. Verrichio. | 139. J. S. Edge. |
| 32. J. W. Branford. | 831. T. Farmer. |
| 33. J. M. Kirby. | 996. W., E., and J. Gray. |
| 34. J. Skelton. | |

From Commissioners of Patents Journal, July 4th.

PATENTS SEALED.

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| 28. W. H. Roy. | 129. F. C. Fourgeau. |
| 40. J. E. Vigouléte. | 138. G. T. Bousfield. |
| 47. W. C. Thurgar. | 143. J. Robinson. |
| 55. G. B. Galoway. | 177. W. Clark. |
| 56. B. W. Bentley. | 214. C. Roques. |
| 60. J. J. Blackham. | 236. C. D. Abel. |
| 63. A. Barlow. | 318. R. Richardson. |
| 64. J. H. Johnson. | 323. E. and T. Williams. |
| 68. W. Davies. | 329. W. Cockburn. |
| 70. B. P. Bidder. | 483. J. H. Johnson. |
| 71. F. Wiese. | 486. W. E. Newton. |
| 74. J. C. Brown. | 977. C. H. Williams. |
| 84. A. F. Lendy. | 1060. J. Rippon. |
| 100. W. Russ. | 1067. C. R. Fisher. |
| 106. G. H. Daw. | 1117. W. Scaratt. |
| 111. W. Brookes. | 1263. S. Bennett. |
| 119. G. Davies. | 1271. W. Clark. |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

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| 1876. J. Parkes. | 1918. C. Lungley. |
| 912. W. Easton. | 1948. J. Howard and J. Bullough. |
| 913. T. Parker. | 1922. J. M. Dunlop. |
| 953. A. Warner. | 1929. T. L. Atkinson. |
| 901. J. Tatham. | 1935. G. Bedson. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

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| 1486. E. Lord. | 1504. J. G. Jennings and J. Lever-grove. |
| 1502. J. G. Jennings. | 1481. H. W. Wimshurst. |